Noreene M. Ignelzi
355A 'C' Street
Friday Harbor, WA 98250-8033

I am Noreene Ignelzi a Marine Educator and Marine Invertebrate Ecologist with The San Juan Nature Institute, an affiliate of the University of Washington. I want to draw attention to the importance of plankton in the food web of the Salish Sea and the impacts of coal dust.

Phytoplankton produces 50% of the world's oxygen through photosynthesis. Zooplankton contains the larval stages of many marine invertebrate species including seastars, urchins, octopus and many commercially important species: crabs, mussels, clams, shrimp, and squid. All planktonic species are environmentally significant. Phytoplankton species, as primary producers, are the base of the food web and we proceed through the web with zooplankton consumed by herring, herring consumed by salmon and salmon consumed by the apex predator orcas. This is a complex process, but I am of course simplifying here.

Needless to say any disturbance to this already stressed system would be catastrophic. Coal dust and the high PAHs (polycyclic aromatic hydrocarbons) it includes would be the nail in the coffin for the Cherry Point Pacific herring. Since 1970, Cherry Pt herring have declined from 17,000 tons of spawning biomass to less than 1,000 tons. They are a linchpin in the food web that includes endangered Chinook salmon, migratory seabirds and Southern Resident Orcas (already threatened by multiple chronic stressors and listed as an endangered species). Herring eggs and larvae (part of zooplankton) are acutely sensitive to the impact of PAHs.

You must assess the risk and impact that this proposed Gateway Pacific Coal Terminal would have upon our already stressed Salish Sea/Puget Sound ecosystem. More scientifically significant studies must be completed in order to even consider this development. Begin by computer modeling plankton ecology using a model such as the biogeochemical model for Puget Sound by Neil Banas at the UW Applied Physics Laboratory. Other scientist such as Terry Klinger of UW FHL studying Ocean change including ocean chemistry should be consulted.

+ Ocean acidification

http://www.prism.washington.edu/story/Modeling+Plankton+Ecology

From nutrient inputs to ecosystems

Linking Puget Sound circulation and watershed and oceanic inputs to the food chain requires biogeochemical models that trace nutrient cycles and describe the growth of phytoplankton and zooplankton. These models, known generically as "NPZ" (nutrient-phytoplankton-zooplankton) model, let us address questions such as

· "How will climate-driven changes in ocean inputs affect the availability of food for Puget Sound salmon over the next fifty years?"

· "How sensitive is the biological depletion of oxygen in Hood Canal to the supply of nutrients from the watershed?"

An NPZ-style model can be linked to a high-resolution circulation model to produce detailed, spatially explicit hindcasts and forecasts, or run in a simpler, idealized physical scenario to make rapid exploration and scenario testing possible.

The Aquatic Biogeochemical Cycling Model (ABC) was developed over the last decade as a general tool for simulating basic nutrient and plankton dynamics in Puget Sound and other Pacific Northwest aquatic ecosystems. Model development was initially funded through PRISM. Additional funding has derived from a partnership among the University of Washington, Washington Department of Ecology, and King County Department of Natural Resources and Parks (KC-DNRP) researchers. This presentation contains more information.

A new biogeochemical model for Puget Sound is currently under development by Neil Banas at the UW Applied Physics Laboratory, building on results from both ABC and recent work on the Washington-Oregon coast which provided new methods for choosing difficult but important model parameters (like the community mortality rate for zooplankton) from local biological observations. This model includes

fluxes between nutrient, phytoplankton, zooplankton, and detritus pools, as well as production and consumption of dissolved oxygen. An interactive version of the model's nitrogen budget can be found in this online visualization, under "NPZD, Banas et al. 09." This conference poster demonstrates an application of the model to Lynch Cove, the southern tip of Hood Canal; it is also in the process of being added to the high-resolution MoSSea circulation model.